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Attorney Docket No. 2950.32US03

APPEAL BRIEF TRANSMITTAL

In re the application of:

	Bi et al.	Confirmation No.: 6843
Application No.:	09/606,884	Examiner: Carol Diane Chaney
Filed:	June 29, 2000	Group Art Unit: 1745
For:	BATTERIES WITH ELECTROACTIVE NANOPARTICLES	

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Transmitted herewith, in triplicate, is a Corrected Appeal Brief with Appendices A-B in the above-identified application, with respect to the Notice of Appeal filed on November 24, 2003. Please note that the Fee for Filing the Appeal Brief was filed on November 20, 2003. Applicants do not believe that an additional fee is due. If this is incorrect, please charge the below references deposit account.

[X] Applicant(s) is/are entitled to small entity status in accordance with 37 CFR 1.27.

Respectfully submitted,

Peter S. Dardi

Peter S. Dardi, Ph.D.
Registration No. 39,650

Please grant any extension of time necessary for entry; charge any fee due to Deposit Account No. 16-0631.

CERTIFICATE OF MAILING

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Peter S. Dardi

Peter S. Dardi

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of: Attorney Docket No.: 2950.32US03

Bi et al. Confirmation No.: 6843

Application No.: 09/606,884 Examiner: Carol Chaney

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For: BATTERIES WITH ELECTROACTIVE NANOPARTICLES

CORRECTED BRIEF FOR APPELANTS

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is an appeal from an Office Action dated April 21, 2003, in which claims 15-19, 38-42 and 47-52 were finally rejected. Applicants appeal the rejection of claims 47-52. A Notice of Appeal was filed on August 21, 2003. This Corrected Brief is in reply to a Notice of Non-Compliance of February 26, 2004.

REAL PARTY IN INTEREST

NanoGram Corporation, a corporation organized under the laws of the state of Delaware, and having offices at 2911 Zanker Road, San Jose, California, has acquired the entire right, title and interest in and to the invention, the application, and any and all patents to be obtained therefore, as per the Assignment, recorded at Reel 010934, Frame 0075 from the inventors to NeoPhotonics Corporation and an assignment from NeoPhotonics Corporation to NanoGram Corporation, recorded at Reel 013957, Frame 0076. Note that NeoPhotonics Corporation was formerly called NanoGram Corporation, and the present NanoGram Corporation was previously a wholly owned subsidiary of NeoPhotonics

Corporation following the formal name change. The present NanoGram Corporation is now an independent corporation, but affiliated with the earlier NanoGram Corporation, now named NeoPhotonics Corporation.

RELATED APPEALS AND INTERFERENCES

NanoGram Corporation has several other patent applications on appeal. In particular, briefs have been filed in case 09/757,519, which has claims rejected over the same reference that is pertinent for the anticipation rejection discussed below.

STATUS OF THE CLAIMS

Claims 1, 4-11, 13-28 and 30-46 have been allowed. Claims 47-52 stand rejected. The pending claims are listed in Appendix A.

STATUS OF AMENDMENTS

The Amendment After Final filed on July 11, 2003 was not entered, but a Supplemental Amendment After Final filed on March 5, 2004 has been entered. Specifically, an Advisory Action of March 23, 2004 indicated that the Supplemental Amendment would be entered for the purposes of the Appeal.

SUMMARY OF INVENTION

The invention relates to cathode compositions and corresponding batteries and methods. The cathode compositions comprise submicron vanadium oxide particles and a binder. The submicron vanadium oxide particles provide superior battery performance, especially in lithium-based batteries.

The allowed claims are directed to cathodes having submicron vanadium oxide particles with very high uniformity in particle size. The high uniformity in particle size is

expressed in terms of the nature of the distribution of sizes around the average particle diameter.

The claims that are the subject of the Supplemental Amendment are directed to lithium based batteries with vanadium oxide particles displaying the improved battery performance discovered by the present applicants. In particular, the claim is directed to an electroactive material having a specified range of energy density when discharged over a specific voltage range.

The appealed claims relate to cathode compositions with submicron vanadium oxide particles without any specification of the particle size uniformity. However, the claims maintain the specification of the submicron character of the particles.

ISSUES

1. Whether claims 47-52 are unpatentable under 35 U.S.C. § 102(a) and (e) as being anticipated by U.S. Patent 5,549,880 to Koksbang?

GROUPING OF CLAIMS

1. Claims 47-52 form a single claim group directed to a cathode composition.

ARGUMENT

I. LEGAL BACKGROUND

The Court of Appeals for the Federal Circuit has exclusive appellate jurisdiction for cases arising under the patent law under 28 U.S.C. § 1295 (a)(1). The Federal Circuit has adopted as binding precedent all holding of its predecessor courts, the U.S. Court of Claims and the U.S. Court of Customs and Patent Appeals. South Corp. v. U.S., 215 USPQ 657 (Fed. Cir. 1982). Therefore, unless they have been overruled en banc, CCPA cases are binding precedent for the present appeal.

A. ANTICIPATION

1. Examiner's Burden

The Examiner has the burden of establishing a prima facie case of anticipation. As such, the Examiner must provide a reference that discloses every element as set forth in the claim. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." Verdegaal Bros. v. Union Oil Co. of California, 814 F2d. 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987) (MPEP §2131).

2. A Single Reference Must Identically Disclose Every Element Set Forth In a Claim To Anticipate The Claim

"In order to constitute anticipatory prior art, a reference must identically disclose the claimed compound..." MPEP 2122 citing In re Schoenwald, 22 USPQ2d 1671, (Fed. Cir. 1992). "For a prior art reference to anticipate in terms of 35 U.S.C. § 102, **every element of the claimed invention must be identically shown in a single reference**. These elements must be arranged as in the claim under review, but this is not an 'ipsissimis verbis' test." In re Bond, 15 USPQ2d 1566, 1567 (Fed. Cir, 1990)(Internal citations omitted and emphasis added.).

"If the prior art reference does not expressly set forth a particular element of the claim, that reference still may anticipate if that element is 'inherent' in its disclosure. To establish inherency, the intrinsic evidence 'must make it clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" In re Robertson, 49 USPQ2d 1949, 1950, 1951 (Fed. Cir. 1999), citing Continental Can Co. v. Monsanto Co., 20 USPQ2d 1746, 1749 (Fed. Cir. 1991).

"Every element of the claimed invention must be literally present, arranged as in the claim. **The identical invention must be shown in as complete detail as is contained in the patent claim.**" Richardson v. U.S. Suzuki Motor Corp., 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)(Internal citations omitted, and emphasis added.); see also MPEP 2131. "Here, as well, anticipation is **not** shown by a prior art disclosure which is only 'substantially the same' as the claimed invention." Jamesbury Corp. v. Litton Industrial Products, Inc., 225 USPQ 253, 256 (Fed. Cir. 1985)(emphasis added).

Similar requirements also hold under an obviousness rejection. Prima facie obviousness is not established if all the elements of the rejected claim are not disclosed or suggested in the cited art. In re Ochiai, 37 USPQ 1127, 1131 (Fed. Cir. 1995). ("The test for obviousness *vel non* is statutory. It requires that one compare the claim's 'subject matter as a whole' with the prior art 'to which said subject matter pertains.'"). See also, MPEP 2143.03 "All Claim Limitations Must Be Taught or Suggested," citing In re Royka, 180 USPQ 580 (CCPA 1974). "To establish prima facie obviousness of a claimed invention, all of the claim limitations must be taught or suggested by the prior art." MPEP 2143.03.

3. Ranges

Claims covering a range of composition narrower than a broader range covered in the prior art are not anticipated, although they may be obvious over the prior art. In re Malagari, 182 USPQ 549, 553 (CCPA 1974). Such claims are analogous to the claim of a species or subgenus within a genus, which may be patentable and generally are not obvious. See MPEP 2131.02 and 2131.03.

4. Compositions Of Matter

It is long established that a composition of matter is indistinguishable from its properties. In re Papesch, 137 USPQ 43, 51 (CCPA 1963); In re Cescon, 177 USPQ 264, 266 (CCPA 1973). There are two types of properties, chemical/compositional properties

and physical properties. The chemical/compositional properties of the composition of matter determine what the material is, while the physical properties relate to the interaction and behavior of the composition of matter. Often unique or unexpected physical properties are used to establish the existence of an unobvious composition when chemical/compositional properties either are unknown or do not fully represent the unobviousness of the composition. However, discovery of a surprising or unexpected physical property does not necessarily control an obviousness determination, and all the evidence under the Graham factors must be considered. See, for example, Richardson-Vicks v. Upjohn Co., 44 USPQ2d 1181, 1187 (Fed. Cir. 1997). **In the present case, the claims do not relate to the discovery of properties of previously known or suggested materials.**

5. To Support A Finding Of Unpatentability Based On Cited Art, The Cited Art Must Provide A Means Of Obtaining The Claimed Composition Or Apparatus

The proposition is well established that the cited art only renders a composition of matter or apparatus unpatentable to the extent that the cited art enables the disputed claims, in other words, if the cited art provides a means of obtaining the claimed composition or apparatus.

> To the extent that anyone may draw an inference from the Von Bramer case that the mere printed conception or the mere printed contemplation which constitutes the designation of a 'compound' is sufficient to show that such a compound is old, regardless of whether the compound is involved in a 35 U.S.C. 102 or 35 U.S.C. 103 rejection, we totally disagree. ... We think, rather, that the true test of any prior art relied upon to show or suggest that a chemical compound is old, is whether the prior art is such as to place the disclosed 'compound' in the possession of the public. In re Brown, 141 USPQ 245, 248-49 (CCPA 1964)(emphasis in original)(citations omitted).

Similarly, see In re Hoeksema, 158 USPQ 596, 600 (CCPA 1968)(emphasis in original):

> We are certain, however, that the invention as a whole is the claimed compound and a way to produce it, wherefore appellant's argument has substance. There has been no showing by the Patent Office in this record that the claimed compound can exist because there is no showing of a known or obvious way to manufacture it; hence, it seems to us that the 'invention as a whole,' which section 103 demands that we consider, is not obvious from the prior art of record.
>
> While there are valid reasons based on public policy as to why this defect in the prior art precludes a finding of obviousness under section 103, In re Brown, supra, its immediate significance in the present inquiry is that it poses yet another difference between the claimed invention and the prior art which must be considered in the context of section 103. So considered, we think the differences between appellant's invention as a whole and the prior art are such that the claimed invention would not be obvious within the contemplation of 35 U.S.C. 103.

The Federal Circuit has further emphasized these issues. "But to be prior art under section 102(b), a reference must be enabling. That is, it must put the claimed invention in the hands of one skilled in the art." In re Sun, 31 USPQ2d 1451, 1453 (Fed. Cir. 1993)(unpublished). Assertions in a prior art reference do not support an anticipation or obviousness rejection unless the references place the claimed invention in the hands of the public. Beckman Instruments Inc. v. LKB Produkter AB, 13 USPQ2d 1301, 1304 (Fed. Cir. 1989). "In order to render a claimed apparatus or method obvious, the prior art must enable one skilled in the art to make and use the apparatus or method." Id. While a properly citable reference is prior art for all that it teaches, references along with the knowledge of a person of ordinary skill in the art must be enabling to place the invention in the hands of the public. In re Paulsen, 31 USPQ2d 1671, 1675 (Fed. Cir. 1994). See also In re Donohue, 226 USPQ 619, 621 (Fed. Cir. 1985).

II. ANALYSIS - REJECTION OVER KOKSBANG '880

The Examiner rejected claims 47-52 under 35 U.S.C. § 102(a) and (e), as anticipated by U.S. Patent 5,549,880 to Koksbang (the Koksbang '880 patent, Appendix

B). The Examiner asserted that the Koksbang patent discloses "secondary lithium batteries comprising a lithiated vanadium oxide cathode active material, a lithium metal anode, and either a polymer electrolyte separator or a solid electrolyte separator." Moreover, the Examiner asserted that the vanadium oxide particles disclosed by the Koksbang patent that are "in the form of a fine powder having a surprisingly small particle size on the order of 0.1 to 5 microns, and typically less than 10 microns" constitute a range of average particle sizes. With all due respect, Applicants do not believe that the Koksbang patent can be reasonably interpreted as suggested by the Examiner. Thus, the Examiner has failed to assert a case of prima facie anticipation. Applicants respectfully request reconsideration of the rejection in view of the following comments.

Under In re Malagari, it seems unclear under the Examiner's position based on overlapping ranges whether or not the rejection should properly be structured as an obviousness rejection rather than an anticipation rejection. See also, Ex parte Lee, 31 USPQ2d 1105 (BPAI, 1993). However, since Applicants maintain that the Koksbang '880 patent clearly does not teach an overlapping range, Applicants do not develop this point further.

The Koksbang '880 patent does not prima facie anticipate Applicants' claimed invention. Specifically, pending claim 15 specifies that the **average** particle size for the claimed collection of metal vanadium oxide particles is less than 500 nanometers. The Koksbang '880 patent does **not** disclose metal vanadium oxide particles with an **average** particle size less than a micron either **explicitly or inherently**. The Koksbang '880 patent describes a lithium vanadium oxide, "in the form of a fine powder having a surprisingly small particle size on the order of 0.1 to 5 microns, and typically less than 10 microns." Column 2, lines 59-61. See also, column 5, lines 4-6. The Koksbang patent **does not identically disclose** the composition of Applicants' invention since the Koksbang patent does not expressly recite that the particle size range disclosed is a range of **average**

particle sizes. Thus, prima facie anticipation **simply is not established** under a vast body of case law relating to anticipation. The Koksbang patent does not describe average particle sizes, and the description should not be rewritten to put this word into the description where it is not present.

Furthermore, the Koksbang '880 patent has **a single example** directed to the production of lithium vanadium oxide. A **single set of reaction conditions** are described for the production of the lithium vanadium oxide from column 4, line 49 to 67. "The product was found to have a surprisingly small particle size on the order of 0.1 to 5 microns, and typically less than 10 microns." Column 5, lines 4-6. **A single powder product has a single average particle size and a single particle size distribution relating to the characteristics of the particles within the powder.** Since the quoted language was used to describe **a single product**, it must be referring to a single distribution of particle sizes that would have a corresponding a **single average** particle size and **not** a range of average particle sizes. Based on a single example with one set of reaction conditions, the only consistent interpretation of the language in the Koksbang '880 patent is that 0.1 to 5 microns refers to a single distribution with an average particle size of roughly 2.5 microns. Since the single set of particle properties disclosed in the Koksbang '880 patent have an average particle size significantly greater than the claimed particle size, the Koksbang '880 patent does not explicitly disclose a collection of metal vanadium oxide particles with an average particle size less than one micron.

It makes no sense to interpret the language in the Example as being a range of average particle sizes when it is referring to a **single** product. Yet this is virtually identical to language found at column 2, lines 59-61. Also, the Examiner has not addressed Applicants' comment regarding the language at column 5, lines 4-6 of the Koksbang patent relating to the Example.

Similarly, the Koksbang '880 patent does not inherently disclose metal vanadium oxide particles with an average particle size less than one micron. Specifically, the

Koksbang patent explicitly discloses the particle size of the lithium vanadium oxide particles. There are no particle collections in the Koksbang '880 patent with inherent size properties that are not described, so there cannot be inherent disclosure relating to average particle sizes. Since the Koksbang '880 patent does not explicitly or inherently disclose metal vanadium oxide particles with an average particle size less than a micron, the Koksbang '880 patent does not anticipate Applicants' claimed invention.

The Examiner further asserts that "factors controlling particle size in precipitation reactions are well-known in the art, and thus would not be necessary to disclose." To be an enabling disclosure based on a range of averages, these factors would certainly need to be well known in the art. However, the Examiner has provided no evidence to support this assertion and thus must be based on personal knowledge of the Examiner. Even though Applicants explicitly requested documentary support of this assertion or an Affidavit from the Examiner under 37 C.F.R. 1.104(d)(2), no such support was provided by the Examiner. Even so these issues would only be relevant under an obviousness rejection, which has not been put forward by the Examiner. Also, the Koksbang patent itself does not disclose how to vary the particle size based on the disclosed process. Thus, the Koksbang '880 patent does not enable a person of ordinary skill in the art to practice Applicants' claimed invention.

Cited references must teach all of the claim elements. Specifically, the cited art must place the invention in the hands of the public to support an obviousness or anticipation rejection. The Koksbang '880 patent simply does not put Applicants' claimed invention in the hands of the public. Certainly, with respect to Applicants' claimed invention, the Examiner has fallen far short of meeting her burden of establishing prima facie anticipation.

The Koksbang '880 patent simply does not describe average particle sizes in the claimed range. Furthermore, to obtain a consistent reading of the language when viewing the Koksbang patent as a whole, the only reasonable reading of the language in the

Koksbang patent is that the particles have a range of particle sizes from 0.1 to 5 microns with an average size of roughly 2.5 microns. The Examiner has failed to establish prima facie anticipation of Applicants' claimed invention based on the Koksbang patent. Since the Koksbang patent does not prima facie anticipate Applicants' claimed invention, Applicants respectfully request withdrawal of the rejection under 35 U.S.C. §102(a) and (e) of claims 47-52 as being anticipated by the Koksbang patent.

CONCLUSIONS AND REQUEST FOR RELIEF

Applicants submit that claims 1, 4-11, 13-28 and 30-52 are in condition for allowance. Thus, Applicants respectfully request the reversal of the rejections of claims 47-52 and the allowance of the application.

Respectfully submitted,

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March 26, 2004
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Peter S. Dardi, Ph.D.

APPENDIX A

PENDING CLAIMS

1. A cathode composition comprising vanadium oxide particles having an average diameter from about 5 nm to about 1000 nm and a binder, wherein the collection of vanadium oxide particles have a distribution in sizes such that at least about 95 percent of the particles have a diameter greater than about 40 percent of the average diameter and less than about 160 percent of the average diameter.

2. (Cancelled)

3. (Cancelled)

4. The cathode composition of claim 1 wherein the binder comprises polyvinlyidene fluoride, polytheylene oxide, polyethylene, polyproplylene, polytetrafluoroethylene, polyacrylates or mixtures or copolymers thereof.

5. The cathode composition of claim 1 further comprising supplementary electrically conductive particles.

6. The cathode composition of claim 5 wherein the supplementary electrically conductive particles comprise carbon.

7. The cathode composition of claim 1 wherein the cathode comprises from about 60 percent by weight to about 98 percent by weight vanadium oxide particles.

8. A battery comprising an anode, a cathode comprising vanadium oxide particles having an average diameter from about 5 nm to about 1000 nm and a binder, and a separator element disposed between the anode and the cathode, wherein the collection of vanadium oxide particles have a distribution in sizes such that at least about 95 percent of the particles have a diameter greater than about 40 percent of the average diameter and less than about 160 percent of the average diameter.

9. The battery of claim 8 wherein the anode comprises lithium metal.

10. The battery of claim 8 wherein the anode comprises a composition that intercalates lithium.

11. The battery of claim 10 wherein the intercalation compound within the anode comprises carbon.

12. (Canceled)

13. The battery of claim 8 wherein the separator element comprises a polymer electrolyte.

14. The battery of claim 8 wherein the separator element comprises a porous polymeric material.

15. A battery comprising an anode, an electrolyte, a cathode and a separator element disposed between the anode and the cathode, the electrolyte comprising lithium ions and the cathode comprising nanoparticles of electroactive material that intercalate lithium ions and a binder, wherein the electroactive material comprises vanadium oxide and wherein the electroactive material in the cathode exhibits an energy density greater than about 900 Wh/kg during discharge of the battery when discharged from 4 volts to 1.8 volts at 25°C.

16. The battery of claim 15 wherein the battery is a secondary battery.

17. The battery of claim 15 wherein the electroactive material in the cathode exhibits an energy density from about 950 Wh/kg to about 1200 Wh/kg.

18. The battery of claim 15 wherein the electroactive nanoparticles comprise vanadium oxide.

19. The battery of claim 15 wherein the electroactive material in the anode comprises a composition that intercalates lithium.

20. A method of forming a battery, the method comprising incorporating a collection of vanadium oxide particles having an average diameter from about 5 nm to about 1000 nm into a cathode structure, wherein the collection of vanadium oxide particles have a distribution in sizes such that at least about 95 percent of the particles have a diameter greater than about 40 percent of the average diameter and less than about 160 percent of the average diameter.

21. The method of claim 20 wherein the incorporation of the collection of vanadium oxide particles into the cathode structure comprises combining a binder with the collection of vanadium oxide particles.

22. The method of claim 21 wherein the binder comprises a polymer.

23. The method of claim 20 wherein the incorporation of the collection of vanadium oxide particles into the cathode structure comprises combining additional electroactive particles with the collection of vanadium oxide particles.

24. The method of claim 20 wherein the incorporation of the collection of vanadium oxide particles into the cathode structure comprises combining electrically conductive particles with the collection of vanadium oxide particles.

25. The method of claim 24 wherein the electrically conductive particles comprise conductive carbon particles or metal particles.

26. The method of claim 20 wherein the vanadium oxide particles have an average diameter from about 5 nm to about 50 nm.

27. The method of claim 20 wherein the binder comprises polyvinylidene fluoride, polyethylene oxide, polyethylene, polypropylene, polytetrafluoroethylene, polyacrylates or mixtures or copolymers thereof.

28. The method of claim 20 wherein the resulting cathode structure comprises from about 60 weight percent to about 98 weight percent vanadium oxide particles.

29. (Cancelled)

30. The cathode composition of claim 1 wherein the collection of vanadium oxide particles have an average particle size of no more than about 500 nm.

31. The cathode composition of claim 1 wherein the collection of vanadium oxide particles have an average particle size of no more than about 400 nm.

32. The cathode composition of claim 1 wherein the collection of vanadium oxide particles have an average particle size of no more than about 300 nm.

33. The cathode composition of claim 1 wherein the collection of vanadium oxide particles have an average particle size of no more than about 200 nm.

34. The battery of claim 8 wherein the collection of vanadium oxide particles have an average particle size of no more than about 500 nm.

35. The battery of claim 8 wherein the collection of vanadium oxide particles have an average particle size of no more than about 400 nm.

36. The battery of claim 8 wherein the collection of vanadium oxide particles have an average particle size of no more than about 300 nm.

37. The battery of claim 8 wherein the collection of vanadium oxide particles have an average particle size of no more than about 200 nm.

38. The battery of claim 15 wherein the nanoparticles comprise vanadium oxide particles and wherein the vanadium oxide particles have an average particle size of no more than about 500 nm.

39. The battery of claim 15 wherein the nanoparticles comprise vanadium oxide particles and wherein the vanadium oxide particles have an average particle size of no more than about 400 nm.

40. The battery of claim 15 wherein the nanoparticles comprise vanadium oxide particles and wherein the vanadium oxide particles have an average particle size of no more than about 300 nm.

41. The battery of claim 15 wherein the nanoparticles comprise vanadium oxide particles and wherein the vanadium oxide particles have an average particle size of no more than about 200 nm.

42. The battery of claim 15 wherein the nanoparticles comprise vanadium oxide particles and wherein the vanadium oxide particles have a distribution in sizes such that at least about 95 percent of the particles have a diameter greater than about 40 percent of the average diameter and less than 160 percent of the average diameter.

43. The method of claim 20 wherein the collection of vanadium oxide particles have an average particle size of no more than about 500 nm.

44. The method of claim 20 wherein the collection of vanadium oxide particles have an average particle size of no more than about 400 nm.

45. The method of claim 20 wherein the collection of vanadium oxide particles have an average particle size of no more than about 300 nm.

46. The method of claim 20 wherein the collection of vanadium oxide particles have an average particle size of no more than about 200 nm.

47. A cathode composition comprising vanadium oxide particles having an average diameter from about 5 nm to about 500 nm and a binder.

48. The cathode composition of claim 47 wherein the collection of vanadium oxide particles has an average particle size of no more than about 400 nm.

49. The cathode composition of claim 47 wherein the collection of vanadium oxide particles has an average particle size of no more than about 300 nm.

50. The cathode composition of claim 47 wherein the collection of vanadium oxide particles has an average particle size of no more than about 200 nm.

51. The cathode composition of claim 47 further comprising supplementary electrically conductive particles.

52. The cathode composition of claim 47 wherein the binder comprises polyvinylidene fluoride, polyethylene oxide, polyethylene, polypropylene, polytetrafluoroethylene, polyacrylates or mixtures or copolymers thereof.

APPENDIX B - U.S. Patent 5,549,880 to Koksbang